

Chemistry Unit Test Review

1. (a) In Thompson's raisin-bun model, what were the electrical charges on the

(i) Raisins? negative (ii) Bun? positive

(b) How was Bohr's model different from Thompson's model of the atom?

Thomson model shows an atom as a positive sphere with embedded electrons. Bohr proposed that electrons travelled around the nucleus in orbits

2. In a Bohr-Rutherford model of the atom,

- (a) Where are the protons found? inside nucleus
 (b) Where are the neutrons found? inside nucleus
 (c) Where are the electrons found? orbiting nucleus
 (d) Which particles make up most of the mass of the atom? protons + neutrons
 (e) Which particles take up most of the space in the atom? electrons

3. Describe how you can use the mass number and atomic number to find the numbers of protons, electrons and neutrons in an atom.

protons = Atomic Number
electrons = Atomic Number
neutrons = Atomic Mass - Atomic Number

4. Explain the difference between a period and a group.

periods are rows (horizontal) from left to right.
groups are columns and go up and down

5. Complete the following table.

	Position in the Periodic Table	Ability to React With Other Elements	Number of Electrons in the Outermost Orbital
Alkali Metals	Grp 1	very reactive → forms compounds with non-metals	1
Halogens	Grp 17	very reactive can form compounds with metals or molecules w/ non-metals.	7
Noble Gases	Grp 18	stable, unreactive do not form compounds	full orbitals, either 2 or 8 electrons

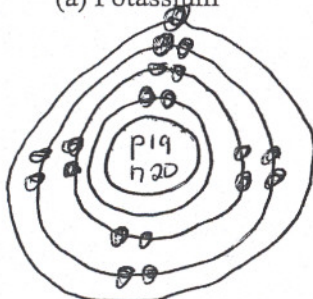
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6. Fill in the blanks with the missing numbers.

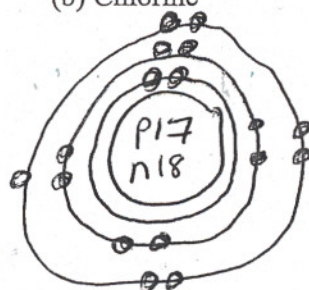
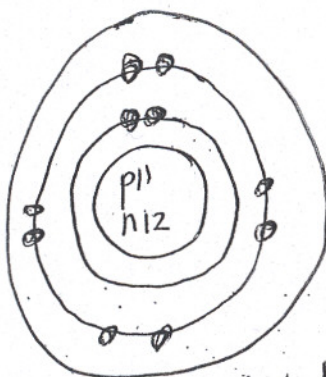
Element	Symbol	Atomic Number	Mass Number	# of Protons	# of Electrons	# of Neutrons	Standard Atomic Notation
Beryllium	Be	4	9	4	4	5	${}^9_4\text{Be}$
Carbon	C	6	12	6	6	6	${}^{12}_6\text{C}$
Silicon	Si	14	28	14	14	14	${}^{28}_{14}\text{Si}$
Potassium	K	19	39	19	19	20	${}^{39}_{19}\text{K}$

7. Draw Bohr-Rutherford diagrams for each of the following neutral atoms.

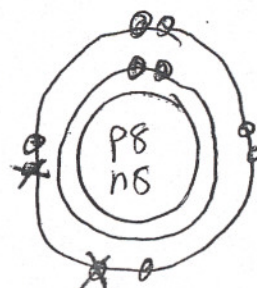
(a) Potassium



(b) Chlorine

8. Draw Bohr-Rutherford diagrams for each of the following ions.a.) sodium ionNa⁺

• lost one electron

b) oxygen ionO⁻²

• gained two electrons

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9. Match the description on the left with one term on the right. Use each term only once.

Description	Term #	Term
Charged <u>particle</u>	<u>6</u>	1. Atomic Number
Number of protons	<u>1</u>	2. Mass number
Positive subatomic particle	<u>3</u>	3. Proton
Sum of protons and neutrons	<u>2</u>	4. Neutron
Uncharged subatomic particle	<u>4</u>	5. Atom
		6. Ion

10. Describe how each of the following atoms gains or loses electrons to form an ion and have a stable number of electrons in its outer shell.

- (a) Beryllium, atomic number 4 lose 2 electrons
- (b) Nitrogen, atomic number 7 gains 3 electrons
- (c) Sulfur, atomic number 16 gains 2 electrons

11. Write the charge for each of the ions in the previous question.

- (a) Be⁺²
- (b) N⁻³
- (c) S⁻²

12. Identify the numbers of protons and neutrons in each of the atoms listed below by interpreting their standard atomic notation.

Standard Atomic Notation	# of Protons	# of Neutrons
$^{35}_{17}\text{Cl}$	<u>17</u>	<u>18</u>
$^{23}_{11}\text{Na}$	<u>11</u>	<u>12</u>
$^{16}_8\text{O}$	<u>8</u>	<u>8</u>

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13. Identify the elements in the following compounds and state the relative numbers of atoms of the elements.

Formula of Compound	Elements in the Compound	Number of Atoms of Each Element
$3\text{Mg}(\text{OH})_2$	Magnesium oxygen hydrogen	3 6 6
$\text{CH}_3\text{COO}(\text{CH}_2)_7\text{CH}_3$	Carbon hydrogen oxygen	10 20 2

14. Write the formula, name and hook diagram for the compound formed by each of the following combinations of elements.

Elements	Combining Capacity	Formula	Name	Hook Diagram
Potassium and chlorine	Potassium = 1 chlorine = 1	KCl	Potassium chloride	
Calcium and oxygen	Calcium = 2 oxygen = 2	CaO	Calcium oxide	

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Aluminum and sulfur	Aluminum=3 Sulfur=2	Al_2S_3	Aluminum Sulfide	
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15. What is an ion?

An atom that has gained or lost electrons

16. What kinds of ions, including number and charge, are formed by

(a) Alkali metals cations, with a charge of +1(b) Halogens anions, with a charge of -1

17. Complete the following chart on ion formation

Group #	1	2	13	14	15	16	17	18
Gain or Loss of Electrons?	Loss	loss	Loss	X	Gain	gain	Gain	X
How Many Electrons?	1	2	3	X	3	2	1	X
Ionic Charge?	+1	+2	+3	X	-3	-2	-1	X

18. Match each test with the appropriate gas in column B.

Column A	Answer	Column B
Limewater test	C	A. Hydrogen gas
Glowing splint test	B	B. Oxygen gas
Burning splint test	A	C. Carbon dioxide

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Scientific method questions

19. Homer notices that his shower is covered in a strange green slime. His friend Barney tells him that coconut juice will get rid of the green slime. Homer decides to check this out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water. After 3 days of "treatment" there is no change in the appearance of the green slime on either side of the shower.

a. What was the hypothesis?

Coconut juice will remove the slime in the bathtub

b. Identify 'the control'

The part of the shower that was sprayed with water.

c. Identify the independent variable

coconut juice

d. Identify the dependent variable

amount of slime

e. What should Homer's conclusion be?

The coconut juice did not get rid of the slime

**PART 2: MATERIAL COVERED BEFORE THE
DECEMBER EXAM**

1. Indicate whether each of the statements is true or false. If you think the statement is false, rewrite it to make it true.

^{Rutherford}
(a) A Bohr diagram shows electrons in orbits around the nucleus.

True

(b) A neutron is ^{neutral} positive and located in the nucleus.

False

(c) Elements in the same ^{period} have similar properties.

False

(d) Noble gases are very unreactive ^{liquids} liquids

False

(e) Alkali metals include sodium, potassium and ^{chlorine} chlorine

False

Rubidium

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(f) Halogens include fluorine, bromine and argon

False

Iodine

(g) Metalloids are compounds that have both metallic and nonmetallic properties.

True

(h) The atomic number increases from left to right across a row of the periodic table.

False

Multiple Choice: circle the best answer to each question.

1. While cleaning out your parents' garage, you find a container with some liquid still in it. The label has almost disappeared from the container, but you can see a symbol on the container like the one shown. What does this symbol tell you about the contents of the container?



- ☐ a. They contain the bony hands of skeletons.
- ☐ b. They are explosive.
- ☒ c. They are corrosive.
- ☐ d. They are poisonous.
- ☐ e. They are incredibly tasty with french fries.

2. Which of the following statements based on the particle theory of matter is INCORRECT?

- ☐ a. Different substances are made of different kinds of particles.
- ☐ b. The particles of a solid substance are always moving.
- ☐ c. The spaces between particles are large in comparison to the particles themselves.
- ☒ d. The attraction between particles in a liquid is weaker than in a gas.

3. You become thirsty while backpacking through Asia and are looking for something to drink when you stumble across a sealed bottle filled with a clear liquid. You cannot speak or read the language on the container's label, so you cannot tell what the liquid is. Fortunately, the label has a symbol container like the one shown. What can you tell about the liquid?



- ☒ a. It is explosive.
- ☐ b. It is corrosive.
- ☐ c. It emits dangerous radiation and particles.
- ☐ d. It is used for creating works of abstract art.
- ☐ e. It is flammable.

4. Which of the following statements is INCORRECT?

- ☐ a. Noble gases have completely filled outer orbitals. ✓
- ☒ b. All physical changes, such as a change of state or breaking, are reversible.
- ☐ c. Gold is a very malleable and ductile metal.
- ☐ d. As gases cool, they occupy smaller volumes.

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- Which of the following statements is INCORRECT?
 - The spaces between particles in a liquid are greater than those in a solid. ✓
 - Liquids have definite, fixed volumes and indefinite shapes ✓
 - Gases have indefinite volumes and indefinite shapes. ✓
 - The attraction between particles increases as the space between particles increases.
- Ketchup flows more slowly than malt vinegar when poured over French fries. Which of the following statements is CORRECT?
 - Ketchup is superior to salt and malt vinegar for fish and chips.
 - Ketchup is more soluble than malt vinegar.
 - Ketchup is less ductile than malt vinegar.
 - Ketchup has a higher viscosity than malt vinegar.
- Which of the following is NOT a chemical property?
 - Reacts with acid
 - Rusts or tarnishes
 - Combustibility/flammability
 - Melts from solid to liquid state
- Which of the following physical properties can NOT be used to describe a solid?
 - Malleability
 - Viscosity
 - Hardness
 - Ductility

SHORT ANSWER

- On the periodic table below label and colour the following groups:

- alkali metals
- halogens
- noble gases
- metalloids

hydrogen 1 H 1.0079																		helium 2 He 4.0026																			
lithium 3 Li 6.941		beryllium 4 Be 9.0122																boron 5 B 10.811		carbon 6 C 12.011		nitrogen 7 N 14.007		oxygen 8 O 15.999		fluorine 9 F 18.998		neon 10 Ne 20.180									
sodium 11 Na 22.990		magnesium 12 Mg 24.305																aluminum 13 Al 26.982		silicon 14 Si 28.086		phosphorus 15 P 30.974		sulfur 16 S 32.06		chlorine 17 Cl 35.453		argon 18 Ar 39.948									
potassium 19 K 39.098		calcium 20 Ca 40.078		scandium 21 Sc 44.956		titanium 22 Ti 47.88		vanadium 23 V 50.942		chromium 24 Cr 51.996		manganese 25 Mn 54.938		iron 26 Fe 55.845		cobalt 27 Co 58.933		nickel 28 Ni 58.693		copper 29 Cu 63.546		zinc 30 Zn 65.38		gallium 31 Ga 69.723		germanium 32 Ge 72.64		arsenic 33 As 74.922		selenium 34 Se 78.96		bromine 35 Br 79.904		krypton 36 Kr 83.80			
rubidium 37 Rb 85.468		strontium 38 Sr 87.62		yttrium 39 Y 88.906		zirconium 40 Zr 91.224		niobium 41 Nb 92.906		molybdenum 42 Mo 95.94		technetium 43 Tc 98		ruthenium 44 Ru 101.07		rhodium 45 Rh 102.91		palladium 46 Pd 106.42		silver 47 Ag 107.87		cadmium 48 Cd 112.41		indium 49 In 114.82		tin 50 Sn 118.71		antimony 51 Sb 121.76		tellurium 52 Te 127.6		iodine 53 I 126.905		xenon 54 Xe 131.29			
cesium 55 Cs 132.91		barium 56 Ba 137.33		57-70 lanthanoids		lutetium 71 Lu 174.97		hafnium 72 Hf 178.49		tantalum 73 Ta 180.95		wolfram 74 W 183.84		rhenium 75 Re 186.21		osmium 76 Os 190.23		iridium 77 Ir 192.22		platinum 78 Pt 195.08		gold 79 Au 196.97		mercury 80 Hg 200.59		thallium 81 Tl 204.38		lead 82 Pb 207.2		bismuth 83 Bi 208.98		polonium 84 Po 209		astatine 85 At 210		radon 86 Rn 222	
francium 87 Fr [223]		radium 88 Ra [226]		89-102 actinoids		lawrencium 103 Lr [261]		rutherfordium 104 Rf [261]		bohrium 105 Db [262]		seaborgium 106 Sg [266]		meitnerium 107 Bh [268]		hassium 108 Hs [277]		darmstadtium 109 Mt [277]		roentgenium 110 Uun [289]		copernicium 111 Uuu [289]		nihonium 112 Uub [289]													

*lanthanoids

**actinoids

lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

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2. Complete the following table with the correct names for the physical changes of state:

Solid to liquid	melting	Liquid to solid	freezing
Liquid to gas	evaporation	Gas to liquid	condensation
Solid to gas	sublimation	Gas to solid	sublimation

3. For the following statements, indicate whether the statement describes a physical change or a chemical change. **State your reason** – if it is a physical change, indicate what kind of change it is (e.g. change of state). If it is a chemical change, indicate **all** applicable reasons (e.g. colour change and precipitate formed).

Statement	Physical Change or Chemical Change? Include a reason for your answer.
Frost forms on a window after you breathe on it in the winter.	Physical change. Your breath is changing from a gas → liquid by cooling = change in state
Sodium hydroxide is added to a clear blue liquid, and a whitish solid is formed.	Chemical change – a precipitate is formed
Yeast converts sugars into carbon dioxide, causing bread to rise.	Chemical change a new substance is formed (gas) Carbon dioxide

4. What are the 5 principles of the Particle Theory of Matter?

- All matter is made up of tiny particles
 - All particles of one substance are the same
 - Different substances are made of different particles
 - Particles are always moving. The more energy they have, the faster they move.
 - There are attractive forces between particles. The forces are stronger when particles are closer
5. Which principle of the Particle Theory of Matter is illustrated in each example below?

- (a) As a hot air balloon heats up, the gas particles push out the balloon's envelope.

D = particles are always moving

- (b) Liquid steel flows to fit the shape of a container, while solid steel has a definite volume and shape.

E – attractive forces increase as space between particles decrease

- (c) Particles of hydrogen gas are different from particles of neon gas.

C = different substances are made of different particles

6. List the 5 clues of a chemical change,

a) a new colour is seen

b) heat or light is given off

c) bubbles are seen

d) mixing 2 clear liquids forms a solid precipitate

e) hard to reverse

7. Name the 3 types of physical changes

• changes of state, dissolving or breaking/grinding

8. Name the 3 types of chemical changes,

• combustion

• corrosion, rusting, tarnishing

• reaction with an acid.

9. Define:

a) independent variable - variable deliberately changed by the scientist. Set up at the beginning of the experiment. Graphed on the x-axis

b) dependent variable - measured by the scientist at the end of the experiment. Graphed on the y-axis.

c) controlled variable

- all other variables EXCEPT the independent and dependent variables that must be kept constant throughout the experiment.